

VCHP Radiators for Lunar and Martian Environments, Phase II

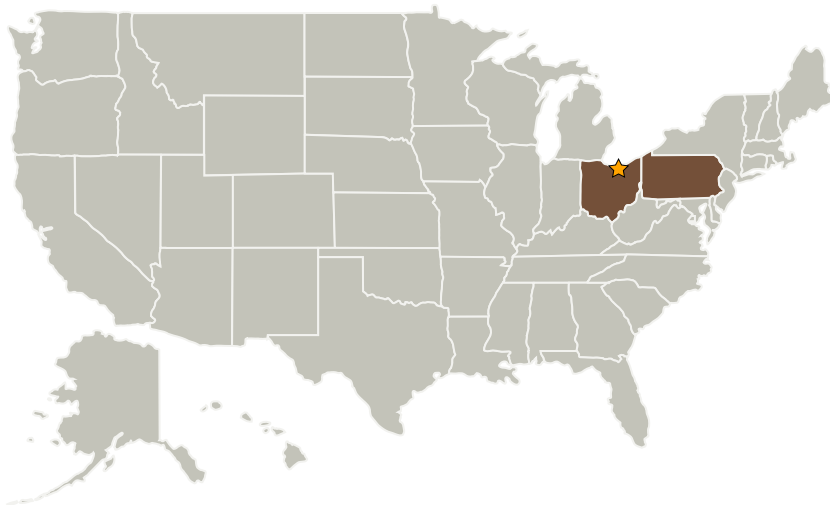
Completed Technology Project (2009 - 2011)



Project Introduction

Long-term Lunar and Martian systems present challenges to thermal systems, including changes in thermal load, and large changes in the thermal environment between day and night. The innovation in the program is the development of a variable conductance heat pipe (VCHP) that passively accommodates the changing thermal load and environment. This allows the heat pipe evaporators (and any attached heat exchanger) to remain at an almost constant temperature. In addition to passively controlling the thermal load, the non condensable gas allows the fluid in the heat pipe to freeze in a controlled manner as the heat pipe is shut down, avoiding damage. The gas in the VCHP also helps with start-up from a frozen condition. The overall technical objective of the Phase I and Phase II programs is to develop a VCHP radiator that can passively adjust to changing temperatures/powers in the Lunar and Martian surface environments while maintaining the coolant outlet temperature in an acceptable range. During the Phase II program, a radiator panel and heat exchanger will be fabricated, then tested in a thermal vacuum chamber. Tests will include thermal cycling, as well as the ability of the radiator to startup from a frozen state.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Advanced Cooling Technologies, Inc.	Supporting Organization	Industry	Lancaster, Pennsylvania

Primary U.S. Work Locations	
Ohio	Pennsylvania

Project Transitions

**January 2009:** Project Start**June 2011:** Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.3 Heat Rejection and Storage